

PRESTACK DEPTH MIGRATION VELOCITY MODEL BUILDING IN COMPLEX CARPATHIANS GEOLOGY

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Abstract

Carpathians geology is very complex and seismic horizons are highly deformed by tectonic movements, existence of thrusts, numerous faults and fracture zones. Therefore, the geological interpretation beneath the overthrust is uncertain and wells cannot be reliably located. Under complex geological conditions, time migration algorithms generate errors resulting from strong horizontal velocity changes. Moreover, the proper focusing of dissipated energy requires application of a PreStack Depth Migration (PreSDM). Proper depth imaging depends on appropriateness of velocity model used for PreSDM. Unfortunately the complexity of velocity changes limits the effectiveness of conventional velocity analysis techniques.

The article focuses on PreSDM velocity model building process for data acquired in complex overthrust environment. The method is based on dual usage of tomographic inversion together with combination of non-seismic information. Combination of tomographic results with well velocities increases convergence of the method. It also limits an ambiguity and improves reliability of final velocity model.

To justify the proposed method, the border value of possible tomographic velocity updates was evaluated. The method was tested on two different datasets acquired in the Polish Carpathians.

Key words: PreStack Depth Migration, velocity model building, seismic tomography, overthrust, Carpathians.